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ABSTRACT

Recent research indicates that fourteen linguistic and paralinguistic patterns--thought to measure uncertainty, vagueness, dependence, and negative affect--discriminate between men's truth telling and deceptive language behavior. This study sought to determine if these same patterns also discriminate between women's truth telling and deceptive language behavior. Seventy-four tape-recorded interviews provided the data for this study. Analysis of the data indicated that only one of the patterns, the "disparaging statements" index, significantly discriminated between women's truth telling and deceptive language. (Author/MAI)

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LINGUISTIC INDICES OF DECEPTION AS MANIFESTED BY WOMEN: A CONTENT ANALYTIC STUDY

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During the past 50 years, considerable research has been done identifying and refining physiological indices of deception (Inbau, 1972). Wilson (1975) has identified some of the more interesting of these studies (Appel, McCarron, & Manning, 1968; Cutrow, Parks, Lucas, & Thomas, 1972; Dana, 1975; Davidson, 1968; Day & Rourke, 1974; Dienstbier & Munter, 1971; Gustafson & Orne, 1963, 1964, 1965; Kugelmass & Lieblich, 1966; Lykken, 1959, 1960; Thackray & Orne, 1967, 1968a, 1968b). Another line of research has identified nonverbal indices of deception (Atmyanandana, 1976; Ekman & Friesen, 1974; Hess, 1975; Luria, 1930; Jaffe, Millman, & Bormann, 1966; Maier, 1966; Maier & Janzen, 1967; Maier & Thurber, 1968; Mehrabian, 1971; Wilson, 1975). A far fewer number of studies have tried to identify linguistic and paralinguistic indices of deception (Horvath, 1973; Knapp, Hart, & Dennis, 1974; Matarazzo, Wiens, Jackson, & Manaugh, 1970; Mehrabian, 1971; Motley, 1974).

Eventually, theorists will try to link what is known about the physiological and nonverbal indices of deception with what is known about the linguistic and paralinguistic indices of deception. But it will not be possible to construct this link until more is known about each of these types of indices. While considerable knowledge has already been obtained about physiological and nonverbal indices, much less is known about linguistic and paralinguistic indices of deception. The present study sought to increase our understanding of linguistic and paralinguistic

indices by introducing a tentative theoretical explanation based on recent findings concerning the discriminatory power of certain linguistic and paralinguistic indices. Also, a study is presented which sought to test this theoretical explanation.

TOWARD A THEORY OF DECEPTION DETECTION USING LINGUISTIC AND PARALINGUISTIC INDICES

Deception is defined as any effort on the part of a person to intentionally misrepresent or falsify his/her beliefs, attitudes, values, or behaviors when communicating with another person. This definition covers instances where people intentionally deceive others in blatant ways (e.g., cheating and perjury), as well as more subtle instances such as role playing at cocktail parties and purposely avoiding the disclosure of information that would allow others to clearly understand one's beliefs, attitudes, or values.

This definition has two key components. The first is that the deceiver "intentionally" deceives others. An emphasis on intention is shared by most deception researchers (Ekman & Friesen, 1969; Flock, 1950; Kubis, 1950; Marcos, 1971; McLaughlin, 1953; Wile, 1942; Wilson; 1975). The second key component is that the deceiver deceives someone other than him/herself, sometimes called "alter deception" (Ekman & Friesen, 1974). The above definition is confined to alter deception, because alter deception is more clearly compatible with classic communication models, where a designated source attempts to elicit a response from a designated

receiver (Berlo, 1960; Carroll, 1955; Lasswell, 1948; McCroskey, 1968; Osgood, 1954; Shannon & Weaver, 1949). In these models, the receiver is not normally also the source.

The Importance of State Anxiety to Deception Detection

A two-part axiom underlies much of the research identifying physiological and nonverbal indices of deception: Deception induces state anxiety, and state anxiety is measurable via changes in physiological and nonverbal behaviors (American Federationist, 1964; Chappell, 1929; Dienstbier & Munter, 1971; Flock, 1950; Gustafson & Orne, 1963; Kubis, 1950; McLaughlin, 1953; Thackray & Orne, 1968a).

According to Spielberger (1966, 1970; Spielberger, Gorsuch, & Lushene, 1969), there are essentially two types of anxiety--"state" and "trait" anxiety. State anxiety is a temporary emotional state that varies in intensity and fluctuates over time. Conversely, trait anxiety is relatively stable and refers to a person's tendency to perceive a wide range of stimulations as threatening. Both state and trait anxieties are characterized by tension, apprehension, and activation of the autonomic nervous system.

It is assumed that state anxiety is the type of anxiety induced by the act of deceiving because deception situations are typically temporary and intermittent, as opposed to ongoing and stable. Accordingly, emotional states associated with deception, e.g., anxiety, would likewise be temporary and intermittent. This description of deception induced

anxiety corresponds exactly with Spielberger's definition of state anxiety.

The state anxiety interpretation is further supported by Heinrich's clarification of Spielberger's theory that state anxiety is caused more by threat than stress (Heinrich, 1975). Threat refers to a person's "subjective perceptions" of the dangers associated with a given situation (e.g., lying); stress refers to the threatening "objective stimulus properties" manifestly characteristic of the stimulus situation (e.g., pending automobile accident, hurricane, earthquake). It is assumed that deceivers experience anxiety as a result of their subjective perceptions of the harmful consequences of lying rather than as a result of the situation per se. Were this not the case, then the polygraph recorder would be ineffective for detecting deceivers, as both truth tellers and deceivers are subjected to the same "objective stimulus properties" of having to take a lie detector test under identical circumstances.

The next subsection explains why deceivers experience state anxiety.

Cognitive Dissonance and
Cultural Learning Theories

Many scholars have summarized the major and minor axioms underlying cognitive dissonance theory (Kiesler, Collins, & Miller, 1969; Minnick, 1968; Spell, 1976; Zimbardo & Ebbesen, 1969):

1. People are motivated to maintain balance among their thoughts, feelings, attitudes, and behaviors.

2. When this balance is disrupted, a person experiences dissonance. Dissonance is experienced in direct proportion to the extent of disruption. The more extensive and intense the disruption, the greater the dissonance.

3. Dissonance motivates the person to restore balance as quickly as possible. The greater the dissonance, the greater the urgency with which one seeks to restore balance. In general, people use the easiest method possible to restore balance.

Although dissonance theorists specify dissonance as the key intermediary variable, there would be no loss in meaning if the term "state anxiety" were used instead. Spielberger's definition of state anxiety conforms in every respect to the above requirements. It is transient, varies in intensity, and is predominately a function of one's conscious perceptions of a given situation. This substitution makes it possible to explain why deceivers experience state anxiety.

By definition, deception creates a situation where one does or says something clearly dissonant with his/her true beliefs, attitudes, or values. The dissonance causes state anxiety, and the anxiety is characterized by measureable changes in physiological, nonverbal, linguistic, and paralinguistic behaviors.

It is important to note that this explanation is culture bound. Culture exerts tremendous influence in our learning and maintenance of a wide range of behaviors (Allport, 1924; Zajonc, 1968). More to the point, Western cultures

teach their children to experience anxiety as a result of deceiving others. However, it is entirely possible that some cultures reward their members for certain types of deception, as in the highly stylized interaction called "whupping the game," which is practiced in many American ghettos (Kochman, 1969).

In summary, two propositions underlie a preliminary theoretical explanation of deception detection based on linguistic and paralinguistic indices. First, whether or not a deceiver experiences state anxiety is culturally determined. Second, if a deceiver experiences state anxiety, it may be detected by measuring changes in linguistic and paralinguistic behaviors. The first proposition is based on cognitive dissonance and cultural learning theories. Empirical support for the second proposition is presented in the next subsection.

Review of literature identifying linguistic and paralinguistic indices of deception induced state anxiety

Matarazzo, Wiens, Jackson, and Manaugh (1970) report two indices: duration of utterances (DOU) and mean reaction time latency (RTL), which discriminated between deceptive and truth telling behavior. The DOU was operationally defined as the mean duration of interviewee utterances, excluding interviewer probes and pauses lasting longer than three seconds. The RTL was defined as the average number of seconds separating the end of an interviewer's probe from the beginning of the interviewee's response.

Statistically significant differences were found for the RTL, with the average RTL for deception conditions being .90, as opposed to .75 for the truth conditions. It was concluded that deceivers take slightly longer to respond to interviewer probes than non-deceivers.

Subsequent research demonstrated that the DOU is also a significant index of deception. Motley (1974) found that deceptive "yes" or "no" responses to questions were significantly shorter than truthful "yes" or "no" responses. Deceptive responses were .03 to .09 seconds shorter than truthful responses. However, since Matarazzo, Wiens, Jackson and Manaugh (1970) had been previously unable to obtain statistically significant support for the discriminatory power of the DOU, its reliability is uncertain.

Two studies (Horvath, 1973; Reid & Arther, 1953) report that liars complain more than truth tellers. Specifically, liars complained about the uncomfortable polygraph equipment, personal problems, and lack of faith in the polygraph recorder's ability to identify deceivers.

Mehrabian (1971) attempted to identify both nonverbal and verbal indices of deception. He found statistically significant differences between deceivers and truth tellers, with the deceivers speaking less, speaking more slowly, and with more speech errors than truth tellers.

Knapp, Hart, and Dennis (1974) have done the most interesting study to date. They obtained statistical support for 14 indices discriminating between deceptive and truth

telling language behavior, and grouped these indices into five clusters which they thought represented independent dimensions of deceptive language behavior.

Two indices comprised an Uncertainty cluster. The confidence ratio index was computed by dividing the "total number of words spoken. . .by the total time the S and confederate (interviewer) spent in verbal interchange" (Knapp, et al., p. 21). The different words index was a count of the total number of distinctly different words spoken by the interviewee.

Four indices comprised the Vagueness cluster: factual statements, self-experience references, past references, and leveling terms. The factual statements index was a count of the number of interviewee "statements which remark about an existing person(s), object(s), or set(s) of conditions that are empirically verifiable by the senses" (Knapp, et al., p. 19). The self-experience references index was a count of the number of "remarks made by the S which expound upon actual experiences he has had (or is having) or upon activities he has engaged in (or is engaging in)" (Knapp, et al., p. 19). The past references index was a count of the total number of past tense verbs uttered by the S. The leveling terms index was a count of "linguistic markers" of "egregiously overgeneralized statements. . . including the words 'all,' 'none,' 'nobody,'"

The Reticence cluster was composed of three indices. The total words index was a count of the total number of

words spoken by the interviewee. The message duration index was tht total duration of interviewee speaking time, measured to the nearest second. The probes index was a count of interviewer probes.

The Dependence cluster was comprised of three indices. The self-references index was a count of the number of first person pronouns uttered by the interviewee. The self-interest index was a count of "statements of either a factual or evaluative character, which state the costs or benefits which have (or have not) accrued, are (or are not) accruing, should (or should not)accrue to self" (Knapp, et al., p. 20). The other references index was a count of the number of third person person plural pronouns uttered by the interviewee.

Lastly, the Negative Affect cluster was comprised of two indices. The number of group references index was a count of the number of first person plural pronouns uttered by the interviewee. The disparaging statements index was a count of the number of interviewee statements "depicting unfavorable actions or statements of another person, group, or institution" (Knapp, et al., p. 20).

Knapp, et al. demonstrated that all the above indices discriminate between deceivers and truth tellers: (1) Nondeceivers were more certain in their communication than deceivers; i.e., their confidence ratios were higher, and they used more different words than deceivers, (2) Nondeceivers were clearer in their communication than deceivers; i.e., they uttered more factual statements, more self-experience

statements, more past-references, and fewer leveling terms than deceivers, (3) Nondeceivers were less reticent; i.e., they uttered more total words, had longer message durations, and required fewer probes than deceivers, (4) Nondeceivers were more independent than deceivers; i.e., they uttered more self-references, more self-interest statements, but fewer other references than deceivers, (5) Nondeceivers were lower in negative affect; i.e., they uttered more group references but fewer disparaging remarks than deceivers.

For several reasons, the study done by Knapp, et al. is the most interesting done to date. First, Knapp and his colleagues identified many more statistically significant indices than had been identified previously. Second, some of these indices are highly similar to those verified by other deception researchers. Specifically, the message duration index is similar to Matarazzo, Wiens, Jackson, and Manaugh's (1970) duration of utterance index; the disparaging statements index is similar to Horvath's (1973) and Reid and Arther's (1953) complaint index; and the total words and confidence ratio indices are similar to Mehrabian's (1971) speech output and speaking rate indices. Thus, the Knapp, et al. findings demonstrate across study reliability for several indices.

Perhaps their most interesting contribution was that o grouping their indices into five clusters, each cluster representing an independent dimension of deceptive language. The notion of independent clusters is important because it provides direction for theory building and research.

Substitute the clusters (verbal descriptions) with vectors (lines of variable length and breadth), and one is provided with a graphic means of discussing theory and research. The Knapp, et al. clusters suggest five vectors plotted in five dimensional space, with all the vectors originating from a common origin and projecting perpendicular to one another. The common origin refers to their shared ability to distinguish deceivers from truth tellers; the perpendicular angles indicate that none of the vectors overlap in conceptual meaning. In other words, the vectors have similar discriminative power, but each vector's power draws from a different explanatory base. Thus, for example, both dependence and negative affect vectors distinguish deceivers from truth tellers, but for different reasons.

A vector's length is determined by the number of significant indices comprising it. The vagueness vector is twice as long as the dependence vector, but only one-fourth longer than the reticence vector. This suggests that more is presently known about the dependence vector than the reticence vector. Accordingly, the former can be used to reach deeper into conceptual space, thereby increasing the probability of discovering other significant constructs.

Vectors also differ in breadth. A very significant index will cause a vector's diameter to widen, while a less significant index will cause it to narrow. A vector comprised of both strong and weak indices gives an odd appearance, as it tapers at some locations and greatly enlarges at others.

In constructing a vector, nonsignificant indices are avoided because the vector could not withstand pressure put on it where that index was located. Too much pressure (interpreted as demand for explanation) would cause the vector to snap, thereby separating knowledge-units that previous researchers had worked hard to bridge. According to this definition, the Knapp et al, vectors are rather narrow, because the constituent indices were verified at .10 alpha levels rather than at the more conservative and conventional .05 or .01 alpha levels.

Despite this weakness, the Knapp et al. study is an important contribution to the deception literature. Its importance lies in suggesting a multidimensional framework for theory building, identifying vectors comprising that framework, and specifying the components of those vectors. Future researchers will want to reinforce and extend this framework.

One way of making the framework stronger would be to increase the breadth of its vectors by replicating the original findings at more conservative alpha levels. Another would be to conduct a factor analysis to be sure that the vectors lie at right angles to one another. Lastly, since Knapp et al. used only male subjects, it would be interesting to determine whether their indices discriminate between deceptive and truth telling behaviors for female subjects as well. The present study attempted to meet all three of

these objectives for the purpose of not only extending the Knapp et al. findings, but also buttressing the tentative theory of deception detection advanced in this article.

Hypotheses

Two sets of hypotheses were tested in this study. The first set was tested to determine whether the Knapp et al. findings would obtain for female subjects. Specifically, it was predicted that females would manifest the following differences between their truth telling and deceptive language behaviors.

Uncertainty indices, hypotheses 1 and 2. The confidence ratio and different words will be higher for truth telling interviews than deception interviews.

Vagueness indices, hypotheses 3 through 6. The factual statements, self-experience statements, and past-experience statements indices will be higher for truth telling interviews than deception interviews. However, the leveling term index will be higher for deception interviews than truth telling interviews.

Reticence indices, hypotheses 7 through 9. The total words and message duration indices will be higher for the truth telling interviews than deception interviews; conversely, the probes index will be higher for deception interviews than truth telling interviews.

Dependence indices, hypotheses 10 through 12. The self-reference and self interest statement indices will be higher for truth telling interviews than deception interviews;

conversely, the other references index will be higher for deception interviews than truth telling interviews.

Negative affect indices, hypotheses 13 and 14. The group references index will be higher for truth telling interviews than deception interviews; conversely, the disparaging statements index will be higher for the deception interviews than the truth telling interviews.

The second set of hypotheses were tested to determine whether there is empirical support for the five dimensional framework suggested by Knapp et al. Specifically, it was predicted that a factor analysis would result in a five factor solution, with the factors corresponding to the Uncertainty, Vagueness, Reticence, Dependence, and Negative Affect clusters posited by Knapp et al.

The first set of hypotheses were tested at alpha levels derived from the Bonferroni method (Games, 1971: Miller, 1966). An overall alpha level of .05 was assigned to each related cluster of hypotheses. This overall alpha level was divided by the number of specific hypotheses comprising a given cluster to determine the particular alpha level at which each individual hypothesis was tested. For example, hypotheses 3 through 6 constituted a related cluster of hypotheses. The specific alpha level at which each of these hypotheses was tested was .012, because .05/4 equals .012.

METHOD

Thirty-seven female volunteer subjects participated in this study. They were invited to participate after a

pool of approximately 200 students were screened for their attitudes toward abortion. These students were enrolled in basic speech courses taught at Florida State University during Fall Quarter, 1975. All Ss agreed with the statement, "A woman should have the right to get an abortion if she wants it," and that they could speak in support of this position for at least two minutes.

Independent Variables

Three independent variables were used in this study. One was an instructional variable consisting of two levels, an interview in which the S was instructed to persuade a female interviewer that she believed it was wrong for a woman to obtain an abortion (deception interview), and one in which the S attempted to persuade a different female interviewer that it was proper for a woman to obtain an abortion if she wanted one (truth telling interview).

The second independent variable consisted of the order in which the Ss underwent the interviews. Half of the Ss underwent the truth telling interview first and the deception interview second. This order was labeled order "A." The remaining Ss underwent the deception interview first and the truth telling interview second (order "B").

The third independent variable consisted of two levels of interviewer.

Dependent Variables

The 14 dependent variables were selected from the Knapp et al. study: confidence ratios, number of different words

spoken, number of factual statements, number of self-experience statements, number of past-reference statements, number of leveling terms, number of total words spoken, message duration, number of interviewer probes, number of self-references, number of self-interest statements, number of other references, number of group references, and number of disparaging statements.

Procedure

Initially, 54 students agreed to participate in this study, but 9 of these failed to keep appointments and 8 others were dropped for failure to follow experimenter's instructions. The remaining 37 students participated in all stages of the study.

Ss were assigned in advance by a table of random numbers to one of four possible interview order-by-interviewer sequences: truth telling interview first, with Ms. C. H. as the interviewer; truth telling interview first, with Ms. J. S. as the interviewer; deception interview first, with Ms. C. H. as the interviewer; and deception interview first, with Ms. J. S. as the interviewer.

Upon arriving at the experimental setting, each S was advised that she would participate in two interviews. In one interview she would try to convince the female interviewer that a woman should have the right to have an abortion if she wants one. In another interview she would try to convince a different female interviewer that a woman should not have the right to get an abortion if she wants one. The S was also advised that a prize of $25.00 would be

awarded to the participant who appeared most convincing in both interviews. S was then told whether the first interview would be deception or truth telling, and given four to five minutes to prepare for the interview.

At the end of the preparation period, S was led to another room for the interview. The interview was tape recorded, with the prior consent of S.

At the end of the interview, S completed a brief questionnaire indicating whether she had followed the truth telling/deception instructions. Eight Ss were eliminated from the study because their responses indicated that they had not told the truth during the truth telling interviews or had not lied during the deception interviews.

After completing the post-interview questionnaire, S was allowed four to five minutes to prepare for the second interview. S was then led to another room where the second interview took place.

After the second interview, S completed another questionnaire indicating whether she had followed the truth telling/deception instructions, whether the money prize served as an incentive for lying and telling the truth during the appropriate interviews, and whether S had prior knowledge of the study. S was then thanked for her participation in the study and asked not to disclose information about it for at least two weeks thereafter.

The interviewers received specialized training prior to participating in the study. Interviewers were instructed

to begin the interviews with the following question, "Do you think a woman should have the right to get an abortion if she wants one? and not to ask additional questions unless the interviewee ran out of things to say. The interviewers were further instructed to allow at least a three second pause before asking a short, open-ended question (e.g., Do you have anything else to say? What else can you tell me about your feelings on this subject? Would you care to elaborate a bit further?) In short, the interviewers were instructed to be passive, neither encouraging nor discouraging participation, and only prompting S if it appeared that she was not going to talk anymore.

A pilot test helped internalize appropriate interviewer psychomotor behaviors. After six pilot Ss had been interviewed, the interviewers and principal investigator listened to tape recordings of the interviews. The investigator noted interactions between the interviewers and interviewees consistent with the above instructions, and verbally reinforced them. Inappropriate interactions were also noted (e.g., an interviewer probe elicited prior to the elapse of a three second interval), and appropriate emphasis was placed on the need to eliminate this behavior. A solution was reached by having the interviewers time pauses lasting three seconds with the aid of a stop watch. Then, without the aid of a stop watch, the interviewers were challenged to indicate when three seconds had elapsed. After this brief training period, the

interviewers could signal a three second interval at will, with high accuracy and frequency.

Data Reduction and Statistical Analyses

The first 2 minutes of each interview were transcribed by three different people. More than one transcriber was needed to ensure reliable, valid transcriptions (Gottschalk, Winget, & Gleser, 1969). These transcriptions were compared to identify and resolve discrepancies. Very few discrepancies (fewer than .05%) were not resolved in this way.

Transcriptions were punched on computer cards. The information punched on cards was in every detail identical to that on the original transcriptions, except that the interviewer probes were eliminated.

The cards were verified twice and then run through the Short Payne computer program. Output for this program consists of a reproduction of the original transcription, an alphabetized list of all utterances occurring in the transcription along with a frequency count for each utterance, a total count of the number of utterances occurring in the transcription, and a total count of the number of different utterances occurring in each transcription.

A team of six graduate students worked as content analysis coders. The students were divided into teams of two members each, with the principal investigator serving

as a third coder on each of the three teams.

Coders were provided with oral and written instructions on how to compute each of the 14 indices, and reliability estimates were obtained as follows. Holsti (1969) reliability indices were computed for 4 of the indices: factual statements (.95), self-experience statements (1.00), past-experience statements (.98), and self-interest statements (.98). The Holsti index is a ratio of all possible coder agreements to coder disagreements. Pearson product moment correlation coefficients were computed for 4 of the indices: confidence ratios (1.00), disparaging statements (.96), number of leveling terms (.98), and message durations (1.00).

It was not necessary to compute reliability indices for 6 of the indices (total number of words, total number of different words, total number of probes, number of self-references, number of other references, and total number of group references), because each of these was computed using a manual or machine count of clearly defined phenomena (e.g., recognition of an utterance, recognition of an interviewer probe). However, each count was taken at least twice by two different coders to avoid counting errors.

Statistical Analyses

A series of 2 X 2 X 2 repeated measures, analysis of variance tests were conducted. Each of these tests were computed in accordance with its appropriate counterpart

hypothesis (hypothesis 1 through 14). The independent variables were interview condition (truth telling versus deception), interview order (lying first, order A, or telling the truth first, order B), and interviewer order (Ms. C. H. first or Ms. J. S. first). The IBS 222 Colorado Institute for Behavior Sciences computer program was used to conduct these analyses.

Factor analyses were conducted which met the following criteria: principal components, varimax rotation, 1's in the diagonals, of the r matrix, and 60/40 criteria for selecting definitive variables. The Bio-Medical 08D computer program was used to conduct these analyses.

RESULTS

Analyses of variance indicated that only one of the indices significantly discriminated between the truth telling and deception interviews (see Table 1). This was the disparaging statements index ($F = 20.94$; critical $F = 5/57$; $df = 1, 33$). The mean for the truth telling interviews was .36, the mean for the deception interviews was 2.29.

(Table 1 about here)

A significant interview-by-order interaction ($F = 17.61$; $df = 1, 33$) was obtained for the probes index. Means were plotted according to a procedure recommended by Lubin (1961) to determine if this interaction prevented significant main effect interpretations.

The plot demonstrated a disordinal as opposed to ordinal interaction, such that order A data disconfirmed

the research hypothesis, while order B data confirmed it (see Figure 1). In other words, order A, Ss needed more probes during the truth interview than during the deception interview: the mean for the truth telling interview was equal to 1.35; the mean for the deception interview was equal to .05. Conversely, order B Ss needed fewer probes during the truth interview than during the deception interview. The mean for the truth telling interview was equal to .34; the mean for the deception interview was equal to 1.53.

(Figure 1 about here)

When disordinal interactions occur, Lubin recommends executing an analysis of variance on those data not affected by repeated measures. Pursuant to this recommendation, the initial interviews obtained under order A (truth telling first) were contrasted with the initial interviews obtained under order B (deception first). Using the BMD01V (one-way ANOVA) program, the obtained F was equal to .1649 and was nonsignificnat (critical $F = 7.56$, $df = 1, 35$).

Factor analyses were done separately on the truth telling and deception language samples. The rotated factor solution for truth telling language appears in Table 2. A four factor solution obtained from the third run accounted for 79% of the common variance. The first factor consists of four variables: total number of different words, total number of words, probes, and message durations. The second factor consists of two variables:

self-references and self-interest statements. The third factor consists of three variables: self-experience statements, disparaging statements, and past references. The fourth factor consists of one variable, group references.

(Table 2 about here)

The rotated factor solution for the deception language samples appears in Table 3. A four factor solution obtained from the second run accounted for 70% of the common variance. The first factor consists of four variables: confidence ratios, total number of different words, total number of words, and other references. The second factor consists of three variables: factual statements, disparaging remarks, and past references. The third factor consists of two variables: self-experience statements and self references. The fourth factor consists of two variables: leveling terms and group references.

DISCUSSION

There are four possible reasons why only one of the a priori hypotheses was verified. First, the money prize may have reduced dissonance, so that Ss did not experience state anxiety when lying. If they did not experience anxiety, then it is possible that they would not have experienced concomitant linguistic and paralinguistic behavior changes. Dissonance theorists call this the "justification effect" (Miller & Burgoon, 1973). Fortunately, data were collected appropriate for testing the viability of the justification explanation. Subject responses

on the post-experiment questionnaire indicated that 17 Ss agreed, strongly agreed, or very strongly agreed that "The possibility of winning $25.00 motivated me to try to persuade the other interviewer that a woman should not have the right to get an abortion if she wants it." None of the remaining 20 Ss agreed that the money prize had served as motivation for deceiving the interviewer. The data for these latter Ss were reanalyzed using a 2 X 2 X 2 ANOVA for repeated measures procedure.

The results of this reanalysis were essentially the same as the results of the initial analysis. The disparaging statements index was the only one which significantly discriminated between the deceptive and truth telling interviews. Accordingly, it is concluded that justification was not a confounding variable. Had it been a confounding variable, reanalysis of the data would have produced results at least slightly different from those obtained from the original analysis. Second, the disparaging statements index is a powerful discriminator, as its statistical significance has been verified twice--once by analysis of the original data pool, once by analysis of a much reduced data pool.

Perhaps men manifest state anxiety differently or in more ways than women, and this is why the present study failed to replicate most of the findings of Knapp and his colleagues. This explanation is substantiated by research findings that American men speak for longer periods of time than American women, both under stressful (Young, 1969)

as well as nonstressful conditions (Wood, 1966). Wood's study distilled the further interesting finding that men tend to encode messages more empirically and objectively descriptive than those encoded by women, but that women tend to encode messages more interpretive and evaluative than those encoded by men.

This latter qualitative difference may explain why the disparaging statements index was the only significant discriminator for women Ss as opposed to 14 significant discriminators for men. Among the original pool of 14 indices, only 3 are essentially qualitative in nature—self interest statements, leveling terms, and disparaging statements. The remaining 11 were quantitative: total words, total different words, other references, etc. Since the quantitative indices outnumbered the qualitative indices by approximately a 4:1 ratio, it is not surprizing that a greater number of them were found to discriminate male deceivers from male truth tellers, than female deceivers from female truth tellers.

A third reason for failing to verify the hypotheses may have been that the alpha levels were too rigorous. The most liberal alpha level used in the present study was .025 as opposed to the more liberal .10 alpha levels used in the Knapp et al. study. Had the present study used a .10 alpha criterion, the critical F value would have been 2.88 (df = 1, 33), and statistical significance

would have been obtained for three additional indices: number of different words, number of words, and message durations (see Table 1). A fourth index, leveling terms, just barely misses the .10 criterion with an obtained F equal to 2.87. Moreover, the means for these indices are in the predicted direction, with the truth telling condition characterized by longer message durations, higher number of word and different word totals, and fewer leveling terms than the deception condition (see Table 4). Thus, while it is important to note that these indices did not reach statistical significance at the present study's a priori alpha levels, it is also important to note that these indices did reach statistical significance at the alpha levels posited by Knapp et al. However, since differences in alpha levels reflect arbitrary differences in research standards, it is really a matter of personal judgment as to whether the present study found statistical significance for the indices in question, and it is the opinion of the present investigators that a .10 alpha level is too liberal a criterion for statistical significance and that none of the above indices should be given any more serious attention than is normally given to indices failing to meet a priori levels of significance.

(Table 4 about here)

A fourth reason for failing to obtain support for the Knapp et al. indices may be that those indices were not

computed precisely in the same way in the present study as they were in the original Knapp et al. study. The present study's coders attempted to compute the Knapp et al. indices according to the examples and instructions presented in their article. Nonetheless, owing to space limitations, the original Knapp et al. article was unclear with respect to some of the coding instructions, and an attempt was made in this study to resolve those discrepancies through personal contacts with the original investigators and through rigorous content analysis training. Accordingly, while it is possible that the present study's coding procedures differed from those used by Knapp, et al., it is also important to emphasize that care was taken to reduce as much as possible the likelihood of this occurrence.

The factor analysis results cannot be interpreted in support of the multidimensional deception framework advanced by Knapp et al. The factor structure distilled from the analysis of truth telling language samples is different from the factor structure distilled from analysis of deception language samples, and neither of these factor structures are comprised of dimensions resembling any of the five clusters of deceptive language theorized by Knapp et al.[1]

In conclusion, the results of this study fail to support the earlier findings of Knapp et al. that 14 linguistic indices reliably discriminate between truth telling and deceptive language behavior. Future investigators

might further attempt to demonstrate the validity of these indices in non-role playing settings, where the likelihood of external validity is greater. In any event, it would appear that disparaging statements, the only significant index obtained in both the Knapp et al. and present study, holds particular promise as an index of deceptive communication, both for women as well as for men.

1. The reader may prefer to accept these factor analyses and interpretations with caution, because the present study implemented a ratio of Ss to variables falling below the 5:1 (Nunnally, 1967) or 4:1 (Linn, 1968) minimum ratio advocated by some factor analysts. When these minimum ratios are not met, some scholars recommend that factor analysis be done only in the spirit of "preliminary" investigation rather than with the intent of reaching definitive conclusions (Comrey, 1973; McCroskey & Young, 1975). However, other scholars point out that it is possible to conduct valid factor analyses even on small samples (Page, 1975). Still others advocate reducing the minimum ratio, as in Vaughan's suggested minimum ratio of 3:1 (Vaughan, 1973). Vaughan's criterion was met in the present study.

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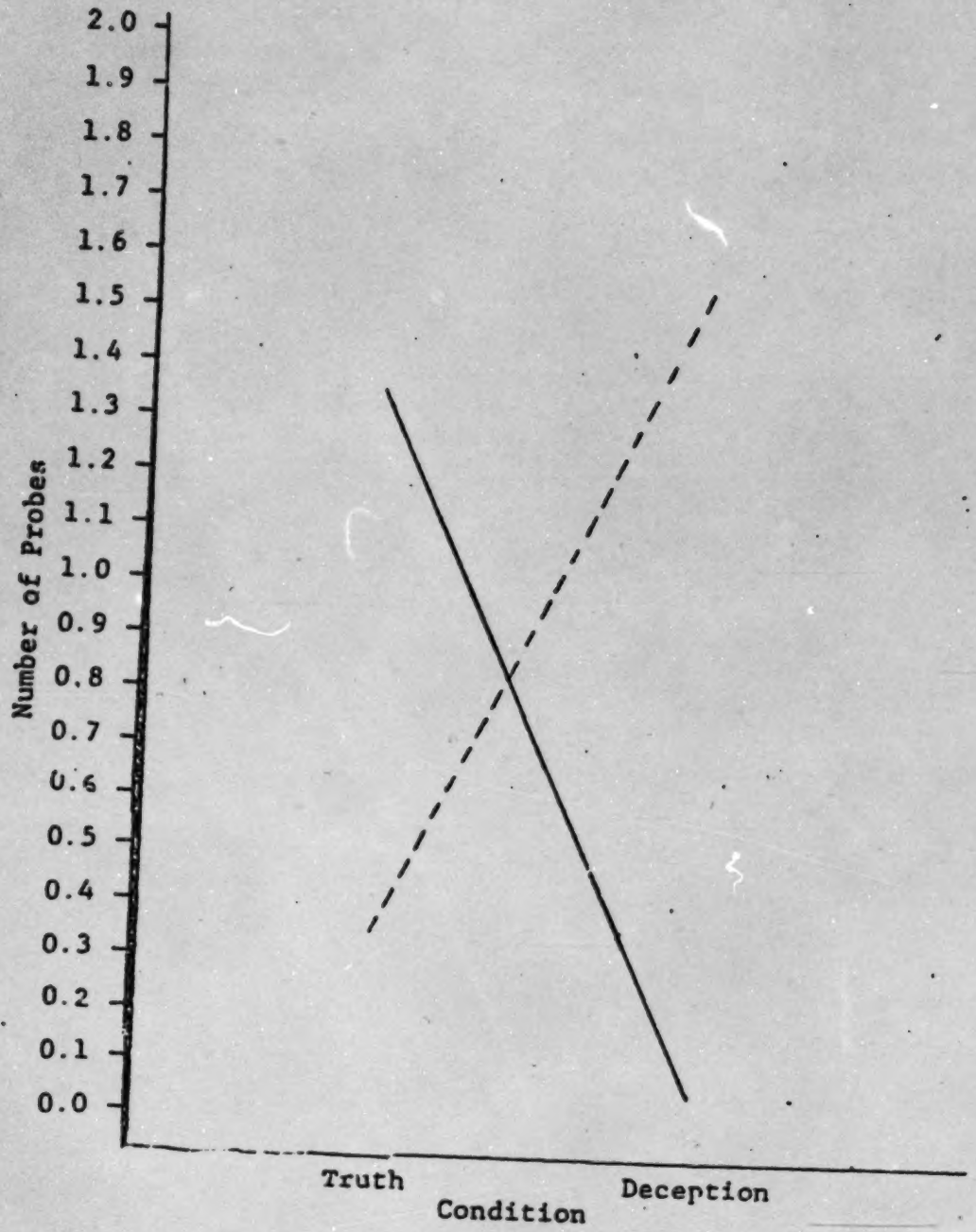

Figure 1. Interviewer by order interaction for probes.

Table 1

Analysis of Variance Results

Indices, F Values, and Bonferroni Derived Alpha Levels
Confidence Ratios (obtained F = 1.21; critical F = 5.57; alpha = .025).
Number of Different Words (obtained F = 5.42; critical F = 5.57; alpha = .025).
Factual Statements (obtained F = .94; critical F = 7.56; alpha = .0125).
Self-Experience Statements (obtained F = .52; critical F = 756; alpha = .0125).
Past-Experience Statements (obtained F = .02; critical F = 7.56; alpha = .0125).
Leveling Terms (obtained F = 2.87; critical F = 7.56; alpha = .0125).
Number of Words (obtained F = 3.76; critical F = 7.56; alpha = .016).
Number of Probes (obtained F = .67; critical F = 7.56; alpha = .016).
Message Durations (obtained F = 3.61; critical F = 7.56; alpha = .016).
Number of Self-References (obtained F = .81; critical F = 7.56; alpha = .016).
Number of Other References (obtained F = 2.44; critical F = 7.56; alpha = .016).
Number of Self-Interest Statements (obtained F = 1.78; critical F = 7.56; alpha = .016).
Number of Group References (obtained F = 1.78; critical F = 5.57; alpha = .025).
Number of Disparaging Statements (obtained F = 20.94; critical F = 5.57; alpha = .025)*

*Statistically Significant at A Priori alpha level.

Table 2

Rotated Factor Matrix for

Truth Data*

Variables	Factors			
	I	II	III	IV
Total Number of Different Words	-.87651	.08412	-.12733	.05039
Self-Exeperience Statements	-.13602	.09857	-.77822	.06577
Total Number of Words	-.86772	.28852	-.15901	-.03237
Self-References	-.02596	.92912	-.10816	.21504
Group References	-.09572	.03201	.06013	.98140
Self-Interest Statements	-.06894	.89931	.17732	-.16586
Probes	.82033	.14963	.08277	-.07565
Disparaging Statements	-.04908	-.18339	-.72020	-.01348
Past Reference Statements	-.18040	.02481	-.80907	-.12371
Message Durations	-.91391	-.01045	-.12013	.04819

*This four factor solution accounted for 78.841% of the total variance. An Eigenvalue of 1.0 was set for rotation criterion.

Table 3

Rotated Factor Matrix for

Deception Data*

Variables	Factors			
	I	II	III	IV
Confidence Ratios	.90802	.13721	-.06269	.01494
Total Number of Different Words	.78277	.29954	.12120	.35565
Factual Statements	.04725	.87518	.10545	-.06744
Self-Experience Statements	-.09078	.04787	.84301	.09035
Leveling Terms	.09729	-.07568	.32284	.66644
Total Number of Words	.93171	.18600	-.02777	.17110
Self-Reference Terms	.20243	.14441	.72383	-.09191
Other References	.62733	-.15070	.15534	-.13716
Group References	.05505	.05696	-.31566	.75940
Disparaging Statements	.35354	.69581	-.09737	-.21238
Past Reference Statements	-.01664	.71644	.19083	.29036

*This four factor solution accounted for 70.315% of the total variance. An Eigenvalue of 1.0 was set for rotation criterion.

Table 4

Means for Number of Different Words, Number of Words, Message Durations, and Leveling Terms

Indices	Truth Telling Condition	Deception Condition
Number of Different Words	134.92	127.35
Number of Words	322.63	305.17
Message Durations*	111.25	106.58
Leveling Terms	3.33	4.46

*Measured in seconds.